

HARVARD EDUCATION AND RESEARCH CENTER ANNUAL REPORT

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Boston, MA

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Section I

ERC summary

The Harvard Education and Research Center's primary objective is the training of leaders in occupational health and safety specialties: occupational (industrial) hygiene, occupational medicine, occupational epidemiology, and occupational injury prevention and control. Through a combination of practical and research oriented coursework and field experiences, graduate students at the Center examine current problems relating to the workplace and learn methods and approaches for establishing health and safe work environments. Our goal is to prepare our students to be national and international leaders for improved understanding and prevention of work-related disease through research and practice.

The Master's program in Occupational Hygiene includes didactic and internship placements, allowing rapid entry to industry. Physicians training in the Occupational and Environmental Medicine Master's and Residency programs are trained for clinical practice, OHS management and leadership, and for academia. The Occupational Epidemiology Program Area confers doctoral degrees in all population aspects of occupational health and safety. In addition, the ERC offers a doctoral preparation in Occupational Epidemiology and Occupational Injury Prevention and Control, with tracks that emphasize biomechanics or injury epidemiology. The Pilot Project Research Training Program makes awards in Region I where graduate trainees in occupational health and safety are supported in advanced research responsive to NORA-2 priorities. The programs in Continuing Professional Education and Outreach are dynamic and creative efforts at serving the occupational safety and health needs of New England and providing an integrative force to link the community. The Continuing Education Program, in collaboration with the Center and the School's Office of Continuing Professional Education offers an impressive slate of courses that meet regional and national needs. The Outreach Program has been successful in impacting the curriculum of other schools of higher education within the region, establishing a network of professionals in New England who are interested in occupational safety and health. Finally, the Targeted Research Training Program aims to provide trainees with multi-disciplinary research education and experience in cutting-edge research projects aimed at addressing NORA priorities and research-to-practice (r2p), including Total Worker Health.

Relevance:

The Harvard ERC plays a vital role in the New England region as well as in the nation in providing interdisciplinary education and training for graduate level professions in key disciplines of occupational health and safety, and providing continuing education and outreach in these key disciplines. The Center produces researchers and practitioners vital to maintaining workplace health and safety, and a healthy workforce.

Key Personnel

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Harvard ERC weblink: <http://www.hsph.harvard.edu/erc/>

Section II

The period from 2013-14 has been very productive for the Education and Research Center (ERC) at Harvard School of Public Health (HSPH). Despite tight federal funding for biomedical and public health research, the Harvard ERC faculty has continued to expand its research portfolio in occupational safety and health (OSH) projects. Moreover, we have maintained our academic programs' quality and enrollment. We currently have 34 trainees, 15 supported by the ERC, and have graduated 1 MS and 5 ScD degree candidates in 2014. Surveys of our graduates indicate that about 90% have been placed in careers related to occupational health and safety. We recognize the importance of underrepresented minority recruitment, and with 2 of our current or 2014 graduate trainees in this category, we will step up activities. A notable highlight is that, *the National Research Council (NRC) of the National Academies of Science issued a report on a detailed assessment of Research Doctorate Programs in the U.S., encompassing 212 programs in 62 fields. The report, issued in September, 2010, ranked our doctoral programs in Occupational Health as #1 in the nation for the fields covering occupational and environmental health, a fact that makes us most proud, and recognizes the doctoral training in the 3 cores that offer such: Occupational Epidemiology, Occupational Hygiene, and Occupational Injury Prevention and Control.*

Occupational Medicine Core

The Occupational Medicine (OM) Core regularly evaluates and adjusts its curriculum and clinical training in response to these entities—NIOSH, ACGME, and the ABPM. In 2013-2014 we formally initiated the new ACGME requirement that residents complete a minimum of four months of direct patient care in each of two years and take both ergonomics and occupational safety. For our program this change means that residents have a mix of academic and clinical experiences in their first year and a mix of clinical and research activities in their second year. We accomplish the four months of direct patient care in the first year by starting with two months of full time clinic in July and August and adding the remaining two months through continuity clinic and full-time clinic in January and May-June.

Residents in our program continue to excel in scholarly activity. Sharon Lee (2014) won the 2014 ACOEM resident research award for her work titled, "Impact of Early Opioid Prescribing Practice in the Emergency Department for Acute Occupational Low Back Pain." Since 2000 the Harvard OEMR residents have won 21 research awards and presented at 12 of the last 15 AOHC Meetings. Dennis Teehan (2013) and Kevin Johnson (2013) had articles published during the most recent year in the American Journal of Cardiology (Dec 2013) and JOEM (May 2014), respectively. We congratulated the four residents who all passed the 2013

ABPM exam to certify in Occupational Medicine and the two residents who certified in General Preventive Medicine.

Occupational (Industrial) Hygiene Core

In the Occupational Hygiene (OH) Core, our goal is to train leaders who will rise to the top of the field and have a broad impact. Our second strategy is to “train the trainers” by encouraging our SM graduates to obtain doctoral training. Over the past year, 2 of our SM graduates have gone on to doctoral studies at HSPH and other schools, and many of those have taken faculty positions in other programs. One of the major critiques of epidemiology is the weakness of its exposure assessment. Epidemiologic researchers with an SM in OH have strong training in exposure assessment. In the past 10 years, we graduated 4 doctoral students in Occupational Epidemiology with previous SM degrees in OH, and most Occupational Epidemiology majors declare a minor in exposure assessment. This is consistent with our philosophy to have an important impact on a closely related discipline.

Faculty research

Jack Dennerlein is working with one of his former doctoral students (Lope Hugo Barrero 2007, currently the Chair of the Industrial Engineering Department at Javeriana University, Colombia) studying whole body vibration among drivers in open pit coal mines. He is looking at average overall vibration as well as the peak, acute exposures to build a model to predict future health outcomes based on their exposure to whole body vibration.

Steve Rudnick continues his work on upper-room ultraviolet germicidal irradiation system for air disinfection. This research on interventions to provide engineering solutions to airborne infections continues the tradition of Dr. Rudnick's, Dr. First. In the past year, Dr. Rudnick published four peer-reviewed articles on various aspects of this topic, for example <http://onlinelibrary.wiley.com/doi/10.1111/ina.12063/abstract>

Alex Lu has investigated colony collapse disorder (CCD) among bees. He found that bees in hives treated with the neonicotinoid pesticides imidacloprid and clothianidin were much more likely to die off over the winter than untreated control hives. Details are at <http://www.bulletinofinsectology.org/pdfarticles/vol67-2014-125-130lu.pdf>

Curriculum revisions

We are extending the Master of Public Health (MPH) professional degree to include 3 semester, 65 credit hour programs available as an option to applicants with a qualifying Bachelor's degree and relevant experience. We will offer this degree in Occupational (Industrial) Hygiene to applicants who have at least one year of work experience in environmental health. Students will take the core courses in occupational/industrial hygiene but all the public health courses (biostatistics, epidemiology etc.) will be packaged into a single, public health core course of about 10 credit hours. This 3-semester MPH option will be available to qualified applicants, and the 2-year (4-semester) MS will still be offered to students who want a research focus. Students will be admitted to this new degree program starting in Fall 2016.

New Faculty

Dr. Joseph Gardner Allen has been appointed to the faculty as Assistant Professor of Exposure Assessment Science. Joe investigates community and occupational exposures and health risks related to a broad range of stressors. He is interested in developing and applying innovative exposure science techniques to solve real-world problems and to conduct epidemiological research. Dr. Allen is a Certified Industrial Hygienist (CIH) and has a particular interest in occupational exposures and health. His recent research in this area involves FAA-funded investigations of the environment in airplanes, including exposures to endocrine-disrupting compounds, volatile organic compounds, noise, bleed-air contaminants, and infectious diseases. Dr. Allen did his undergraduate work in biology at Wesleyan University and Boston College. He earned both a master's in public health and a doctoral degree in exposure assessment from Boston University in 2008.

Occupational Epidemiology Core

The Occupational Epidemiology academic training program enjoyed growth and is quite large due to our success in leveraging other training grants (such as the NIEHS-funded Environmental Epidemiology T32 grant), TRT supplement research support, and accessing scholarship resources available at Harvard. Currently, this academic program has the largest number 18 of doctoral candidates in any of the ERC core programs. The Core is extremely successful in producing researchers in this field, as evidenced by the publication record and jobs the graduates have secured. Examples of recent successes are Jennifer Cavallari, who is now an assistant professor at University of Connecticut Health Sciences Center in Occupational Health; Shona Fang, a research scientist at New England Research Institute, focusing on occupational epidemiology; Amar Mehta, a research scientist at the Harvard School of Public Health; Christine Dobson, who has taken a job for the State of California Health Department, focused on occupational health; and Kerry Sousa, an epidemiologist with NIOSH.

Occupational Injury Prevention Program

The Occupational Injury Prevention Research Training Program continues to grow in both the number of trainees and funded research, in part due to our strong collaborations and integration with the Liberty Mutual HSPH program in Occupational Safety and Health, the HSPH Center for Work, Health and Wellbeing, and the Harvard Clinical Orthopedic and Musculoskeletal Education and Training (COMET) T32 program. In the past year the program graduated one doctoral student and enrolled two new doctoral students. The program is now under the direction of Jack T. Dennerlein, PhD, adjunct professor of ergonomics and safety, and David A. Lombardi, PhD, instructor of injury epidemiology. Consistent with NIOSH and NORA strategic goals, the injury program seeks to produce the next generation of diverse and qualified researchers and public health professionals that have the multidisciplinary skills necessary to design, conduct, and evaluate research studies that identify emerging and critical issues in the etiology and prevention of occupational injury. Specifically, the program aims to provide interdisciplinary training for future professionals and researchers with traditional disciplinary backgrounds to expand the breadth and depth of their knowledge within the transdisciplinary public health framework.

Targeted Research Training

TRT support is essential in providing support for trainees to obtain *multidisciplinary* and *research to practice (r2p)* doctoral education and training. In the current year, we added a trainee whose doctoral program is committed to Total Worker Health, and represents another collaboration with the HSPH Center for a Healthy Workforce. It is important to note that all trainees are part of an ERC academic core that offers a doctoral degree, further integrating TRT research support into our approved doctoral programs (Occupational Epidemiology, Occupational Hygiene, and Injury Prevention and Control). TRT r2p activities are closely linked to the Outreach Program and the Total Worker Health Center.

Other ERC Highlights and Accomplishments:

The Harvard ERC **Continuing Education** program has seen considerable growth in the areas of program development and innovation since the last reporting period. Housed within Executive and Continuing Professional Education (ECPE), the CE program benefits from an organizational structure that supports a systematic process to improve professional practice through the sharing of expertise and research results generated by the faculty at Harvard School of Public Health (HSPH). To support this mission, the ECPE Faculty Advisory Committee began a new tenure in July 2013. Newly restructured and expanded with the goal of representation from all departments at HSPH, CE courses are now better positioned to fully benefit from the broad range of expertise at HSPH.

Integrated into the extensive course planning process is the goal of finding ways to continue to improve the skills of professionals working in public health by translating educational needs into practice. To that end, ECPE is working in collaboration with HSPH Alumni Affairs to identify opportunities and to create a communication strategy to reach out to alumni who can benefit from the diverse portfolio of CE offerings. CE continues to explore opportunities for the development of an online or hybrid course offering, for which all or part of curriculum could be delivered online. This would be particularly beneficial for potential participants who are price sensitive fields.

Operational systems at ECPE have also seen improvements, including a redesign of the customer relationship management database that is now better able to streamline communications to course participants and report more effectively on enrollment trends. These improvements have resulted in a standardization of processes and greater data-reporting capacity that allows for the creation of metrics for performance measurement as well as actionable data for course marketing efforts.

A few note-worthy course highlights:

Management and Leadership Skills for Environmental Health and Safety Professionals: This highly sought after course for health and safety managers continues to have great success in terms of curriculum development and enrollment. Course Directors have expanded the content to include an additional half day focused on transformational leadership with speakers from industry. Course evaluations indicate that these new sessions have been very well-received, as speakers focus on real world experiences implementing a culture of safety. This half day fits in well with the highly interactive and practical sessions on the other three days. In terms of audience, this course has consistently sold out, generating a substantial waiting list.

Work, Health, and Well-Being: Integrating Wellness and Occupational Health and Safety in the Workplace: The introduction of this course represents a unique opportunity for professionals interested in creating a path to sustainable, integrated cultures of corporate safety and health. It is designed to provide participants with the skills necessary to evaluate the effectiveness of workplace health strategies, translate this evidence into practice, and implement these strategies to design health promotion and occupational health and safety programs. After attending the sold out, second iteration of this course, a senior Health and Safety Manager at Alyeska Pipeline Service Co. in Wasilla, Alaska said he was very energized to implement much of what he learned. In particular, after attending Prof. Orfeu M. Buxton's "Integrated Workplace Interventions to Improve Sleep and Health" session, he was telling ECPE staff that while they already had many safeguards in place for their shift workers, he realized they needed to do more. Shift workers in Alaska are exposed to either very long or very short hours of sunlight, but it had never occurred to management that protections needed to be put in place in order to reduce their exposure to the blue lights emitted by the computer screens surrounding them. Since this light would also negatively affect their circadian rhythms, he was planning to put protections in place for his workers upon returning to Alaska.

Our **Outreach Program** has continued to expand the Visiting Scholars Program for area college faculty and stakeholders. Curricula impact, resulting from the efforts of visiting scholars, at Worcester State College included putting 85 undergraduate and graduate nursing students through occupational health practicum experiences, and at the University of Connecticut, Storrs included continuing to draw students to the visiting scholar initiated Occupational and Environmental Health Sciences (OEHS) PhD and baccalaureate programs. In Maine, the visiting scholar founded Maine Indoor Air Quality Council has established a strong reputation as the largest air quality conference in the region, drawing large audiences to its annual conference with topics on mold, ventilation, green cleaners, and the effect of climate change on indoor air quality. Steve Dickens, a visiting scholar in Vermont, recently established the nation's first employee assistance program (EAP) for dairy farmers, and teamed up with photojournalist Earl Dotter to present at Raising Safety: The 2013 North American Agricultural Safety Summit. Their presentation, "Reducing Stress to Minimize Injury: The Nation's First Employee Assistance Program for Dairy Farmers" was published in the Journal of Agromedicine, April 2014.

In addition, outreach to another underserved population—New England's fishing communities, which continue to suffer loss fatalities and vessel loss—is a priority for our outreach and research-to-practice activities. Through the Maine Commercial Fishing Safety Council, Ann Backus and other members are addressing the high numbers of capsizes in the scallop industry through photographs and engagement with scallop fishermen.

The Minority Mentorship Program (MMP) accepted five new mentees for this year from an application pool of over 30. One 2013 MMP graduate who began by attending toolbox talks on construction sites transitioned during her MMP to intense survey data work that culminated in an abstract for a conference presentation. Another 2013 graduate who entered the program interested in pediatrics, through her mentorship with our faculty member, Carolyn Langer, MD, MPH, JD, realized an interest in public health policy and now seeks an

MPH and law degree.

The **Pilot Project Research Training Program** has supported master, doctoral, and postdoctoral trainees who work with their mentors on specific occupational health and safety topics. This program has led to new research directions in several areas, including injury topics (ladder and construction) and disease mechanisms (toxicogenomics of airborne endotoxin exposure) and exposure sources (exposure to bisphenol A among cashiers). The pilot projects have also led to several new grant applications and formed the basis for doctoral dissertations.

Another important accomplishment of the ERC has been **strengthening ties with other training programs and centers in HSPH**, thus extending the reach of the ERC as well as opening up additional cross-disciplinary opportunities for ERC students. These ties include the Work-Life Center, funded by NIOSH and led by Dr. Glorian Sorensen, the Environmental Epidemiology Training T32 grant, led by Dr. David Christiani, the musculoskeletal disorder T32 led by Dr. Jeff Katz and the summer minority training programs in Biostatistics and in Epidemiology.

In **summary**, the Harvard ERC has met the NIOSH mandate to provide an adequate supply of qualified OSH personnel to carry out the purposes of the OSHA Act by educating and training an outstanding cadre of professionals in several OSH disciplines who have gone on to regional and national recognition in their respective fields. Moreover, we have continued a tradition of academic excellence by training educators and investigators who have become leaders in key government agencies (e.g., the NIOSH director, Dr. Howard, is a Harvard ERC graduate), in academia (e.g., Dr. Howard Frumkin is Dean of the University of Washington School of Public Health and Dr. Howard Hu is the dean of Dalla Lana School of Public Health; as well as numerous department chairs and a number of other ERC directors), and in Industry (e.g., Shannon Magari is a Principal Senior VP of Colder Corp.). We serve as a regional resource for industry, labor, government, and the general public, conduct extensive peer-reviewed research essential to standard-setting, continue professional education and outreach, and balance our research and practice portfolio with innovative research to practice initiatives. We are cross-cutting and interdisciplinary in our research and training, and provide multi-level practitioner and research training of the highest quality. The evidence of our success is found in the number and quality of our publications, the positions that our graduates secure upon graduation, the leadership roles of many of our graduates, the impact on OSH standards and practice from our research, and the regional and national resource we have been for OSH stakeholders (industry, labor, government and academia).